Brown-Séquard's experiments, it will be seen that I have not been able to furnish any approach to a full corroboration. But I must repeat that my own experiments have not as yet been sufficiently numerous to justify me in repudiating those of his statements which I have not been ably to verify" (p. 122).

The second section of the work deals with "Utility," and opens with the contention already familiar in the author's earlier writings, that natural selection is not a theory of the origin of species, but of the origin of adaptations. The discussion throughout this section is of great interest, although perhaps somewhat too controversial in tone; but this is a consequence of previous controversies on the same subject. The effect of controversy here, as in other cases, is to emphasise the differences of opinion. The present writer ventures to think that if this question of the utility of specific characters were treated less controversially and more by the discussion of particular examples, very little difference of opinion would be found to exist. The essence of the question is contained in the definition of the term "specific character," and this again depends on the definition of the term "species." But we know that no satisfactory, viz. generally applicable, objective definition of species can be given, inasmuch as the subjective ideas of the species describer have been of pre-eminent importance.

In certain classes of cases the species describer has, and obviously correctly, made adaptive characters his criteria; for instance, in the species of Ranunculus alluded to by Mr. Thiselton-Dyer in his discussion of this question, as President of Section D, at Bath (British Association Reports, p. 692). Of the opposite kind are the various representative races or species which we meet as we trace the distribution of numerous forms of life over the earth's surface, and which are especially well seen in the Heliconine Danainæ from tropical America, in the Godman-Salvin Collection. Following one of these forms in its range we find, in numerous cases, that different areas are characterised by differences in the colours and markings of the wings. The colours and markings themselves are believed by many to be adaptive, and to be of value for the purposes of warning; but the local differences alluded to cannot be explained in this way, except in the cases of mimicry between local forms. Assuming the received explanation to be correct, natural selection would appear to have operated only in preventing the local differences from diminishing the efficiency of the warning character. But these local forms of colouring and marking are made the criteria—and are, indeed, apparently the only criteria—of specific distinction in numberless cases. It may be that, in many of these cases, future investigation will prove a biological continuity of the forms over the whole of the range, so that the names which are now applied to species will have to be used for geographical races. In the interests of biological science it is necessary that the naming of different forms should proceed at a much faster rate than the scientific proof of specific rank: indeed, the latter must, in the majority of cases, be a very slow and arduous process. Much confusion and controversy would be avoided if describers were clearly to state, as regards a large proportion of the forms described every day, that specific rank is only provisionally claimed. There is abundant justification for conferring a name, or a number, or some kind of ticket, upon every clearly marked form, quite apart from the question of its specific rank.

It therefore follows that this controversy must be a barren one as regards a very large proportion of the forms which are now distinguished as species, especially in groups like the Insecta, in which such forms are most numerous. Among the cases in which specific rank is indisputable, it can hardly be maintained that all the superficial differences between two allied species which have resulted from separation on the opposite sides of some geographical barrier, are necessarily adaptive.

This work, like all the writings of its author, is sure to appeal to a wide circle of readers, and will be of high value in bringing before the public the discussion, by an exceptionally acute thinker, of some of the most disputed and difficult points in modern theories of evolution; while biological science cannot fail to gain by the attention directed to the need for further observation and experiment in order that a final decision may be reached.

E. B. P.

COMPLETION OF THE "INDEX-CATALOGUE."

Index-Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects. Vol. xvi. W—Zythus. Folio, pp. xiv. + [282] + 822. (Washington: Government Printing Office, 1895.)

THIS sixteenth volume completes the twenty years' labour of Dr. J. S. Billings, and brings the catalogue of the finest medical library in the world to the close of the alphabet. We have in previous articles remarked on its extraordinary fulness, and its value to all engaged in the study of medical literature. For it is not merely a guide to the Washington Library; it is a classified index to something like a moiety of all that has ever been published on medicine and its allied sciences. Ample and distinctive descriptions are given of more than 300,000 books and articles, with over 800,000 cross-references. The volume before us has an additional feature of the greatest usefulness. No less than 282 folio pages are required to contain a list of the abbreviated and the complete titles of the periodicals, transactions, reports, and the like, now or formerly issued in all parts of the world and in every civilised language. The abbreviations are those used in the catalogue; but they are so concise, and at the same time so sufficient, that it would be well if they could be uniformly adopted by all who quote—and give their authority.

The recent international testimonial to Dr. Billings, and the public banquet at which, with his fellow-workers, Dr. Chadwick, of Boston, and Dr. Fletcher, originally of Bristol, he was a few weeks ago honoured in Philadelphia, have furnished some indication of the widespread feeling of grateful admiration his great enterprise has evoked among his medical and scientific brethren. The feeling has found stately expression in the Latin diploma whereby an honorary doctorate was conferred by the University of Munich on the Surgeon-General:

© 1896 Nature Publishing Group

"A man who deserves of his country and of literature the highest praise, not only for his numerous important writings on the relations of physicians, on the proper construction and administration of hospitals, on the public health of the United States according to the precepts of the science and art of hygiene, on the preservation and improvement of the health of the army, but also for the great collections thereto relating which he has established and extended; a man who, in the "Index Medicus" of which he is the editor, includes by indefatigable industry all the branches of medicine that are being advanced throughout the whole world, who also, as author of the book entitled the "Index-Catalogue," which by the remarkable munificence of the Government of the United States has been laid before an immense number of learned men, has entitled himself to the gratitude of physicians and students of history over the entire world, and has fashioned for himself a monument more enduring than brass."

It must be remembered that not only the "Catalogue" but the Library itself is essentially of Dr. Billings' creation, and that about one-sixth of its contents have been presented either by way of direct gift or in exchange. It speaks highly for his personal "magnetism" that he can write: "There are few medical writers now living who have not sent to the Library at least one pamphlet." Thus, while the "Catalogue" has been passing through the press, a multitude of fresh gifts and additions have accumulated, and the completion of the "first series" only makes way for the commencement of a second. The manuscript of this is already prepared, and will be forthwith printed in five volumes as large and full as those already given to the world. Dr. Billings has taken up new duties in a different sphere of activity; but the "labour of love" which he here dedicates to international science will still be carried on under the inspiration of his singular genius. The gratitude of his innumerable debtors will be enhanced by a lively expectation of benefits to come.

OUR BOOK SHELF.

Mesures Électriques. By Eric Gerard. (Paris: Gauthier-Villars et Fils, 1896.)

TO those who are acquainted with M. Gerard's previous work ("Leçons sur l'Électricité"), the publication of the present work will probably be extremely welcome, for in it he has, in his usual clear and satisfactory style, gone more fully into the question of the measurement of electrical quantities.

In an introductory chapter, the author considers the question of the errors of observation, and the effects they have on the final result. In this discussion, that interesting branch of pure mathematics called the method of least squares for determining the probable error, and which, in the hands of many observers, seems to perform much the same function as the ink does in the case of the cuttle-fish, is left comparatively in the background. Such questions as errors of observation—properly so called—and of systematic errors are, however, dealt with, and the importance of exercising judgment in deciding the accuracy with which the different quantities have to be observed, in order that the result may be correct to within a certain amount, is insisted upon. There is one paragraph which ought to be written up as a text in all laboratories and testing-rooms, and is to the effect that in making electrical connections too much care cannot be taken in arranging the wires and in cleaning the contacts, and that connecting wires ought not to consist of long spirals, for these only serve to increase the resistance and self-induction of the circuit. Some very useful instructions as to the best method of recording observations are given, together with some hints as to choice of an algebraic function to represent a given curve.

There is also a chapter on the measurement of lengths, time, angles, forces, velocity and power; and one on photometry, a subject which, since the expiration of the incandescent lamp patent, and the introduction of the incandescent gas-lamp, has become of very great importance to the electrician.

The more purely electrical part of the book consists of chapters on electrical standards, galvanometers (including ammeters), voltmeters, coulomb- and watt-meters, and two very fairly complete chapters on the measurement of self-induction, and the magnetic properties of iron. There are also chapters on the measurements of the characteristics of motors and dynamos (both for continuous and alternating currents), and on transformers. Although the devotee to the slide-rule is probably born and not made, an appendix on this instrument may be of service to those who have not yet been initiated.

The whole book is essentially a practical and readable text-book, though, perhaps, hardly a laboratory manual of the subject; it is remarkably free from useless and uncalled-for mathematical formulæ, and will undoubtedly be found of great use. W. W.

Problems in the Use and Adjustment of Engineering Instruments. By Walter Loring Webb, C.E. (Pp. iv + 64. (New York: John Wiley and Sons. London: Chapman and Hall, Ltd., 1895.)

IN every college or university where field work is a subject in the curriculum, such a book as this is found to be almost indispensable. Its aim is to set out problems for each student or group of students to pursue, in order that no time shall be lost, and so that every one may have complete practice with individual instruments. For such a purpose, this is perhaps one of the most concisely written books on the subject, and it at the same time covers a large amount of ground, from single chain measurement to a preliminary railroad survey.

Besides the instruments usually noted, one is glad to see instruction with the plane table and Amsley's polar planimeter, both such very admirable instruments when used with precision, that it is remarkable their introduction is not more universal. Throughout the book, convenient forms for entering notes are shown, and there is also a short chapter on the use of the formulæ of probable error, the utility of which cannot be over-estimated.

Graphic Arithmetic. By H. D. Ellis. (Philip and Son, 1896.)

THIS contribution to the teaching of arithmetic consists of two charts, each 40 in. by 10 in., which can be mounted, or otherwise adapted to class teaching. Chart i., whole numbers, consists of a series of horizontal lines, divided by dots respectively into ones, twos, threes, &c., twelves. By means of vertical lines the multiples of 2, 3, &c., are shown on the line of ones, which is numbered from 0 to 144. In Chart ii., fractions (vulgar and decimal), the series of horizontal lines are 1 metre in length and 1 cm. apart. These lines are divided by dots into halves, thirds, &c., tenths. There are subdivisions into hundredths (cm.) and thousandths (millim). On Chart i. explanations are given of magnitude, unit, number, multiple, &c.; and on ii., of the multiplication and division of decimals, the expression of a vulgar fraction as a decimal, and several other matters. The charts are well adapted for the purpose of giving a sound grounding in the subject, so far as they go.

© 1896 Nature Publishing Group